

Snow on Ground at End of Month.—Isolated stations report the following depths in inches: Auburn, N. H., 5; Mt. Washington, 20; Burlington, Vt., 0 to 1; Oswego, N. Y., trace; Fallington, Pa., 0.25; Edgerton, Wis., 2.81; near Ft. Madison, Ia., 4.50; Morriston, Dak., 18; Deadwood, Dak., trace; Pike's Peak, 16.75.

Hail-storms were of considerable frequency west of the Mississippi and north of the Ohio. Beyond these boundaries, to the eastward, only three stations reported, viz: Ocean City, N. J., 2nd; Wytheville, Va., 7th; Point Judith, R. I., 14th. To the westward in the various States on the following dates: Texas, 5th, 7th, 20th, 21st, 24th, 25th and 29th. Louisiana, 12th, 21st, 29th. Arkansas, 11th and 12th; Fayetteville, 11th, very violent, storm preceded by dark heavy clouds rushing together from northwest and southwest, hailstones falling as they met; many stones from two to two-and-a-half inches in diameter; iron and tin roofs badly damaged. Indian Territory, 17th. Missouri, 29th and 30th; Ironton, 29th, town and surrounding country visited by the heaviest hail-storm ever known in this section: storm lasted about five minutes; most of the stones were as large as hen's eggs, some of them measuring more than seven inches in circumference; nearly all glass in the northern side of buildings was broken and foliage and vegetation badly damaged. Illinois, 9th, 11th, 28th and 29th. Indiana, 11th, 25th and 28th; the storm of the 28th seemed to be quite extensive, as it was reported from southern Illinois, northwestward along the Ohio River to points beyond Cincinnati. Ohio, 15th and 28th. Michigan, 16th, 28th and 30th. Minnesota, 5th, 29th and 30th. Dakota, 5th, 14th, 26th, 29th and 30th. Nebraska, 6th and 29th. Kansas, 1st, 2nd, 10th, 17th, 20th, 29th and 30th. New Mexico, 5th, 6th, 7th, 12th and 16th. Colorado, 5th, 6th, 8th, 12th, 29th and 30th. Wyoming, 9th, 10th, 14th, 17th and 23rd. Montana, 19th and 27th. Utah, Salt Lake City, 23rd. Nevada, Pioche, 18th. Arizona, 15th and 16th. California, Yosemite valley, 30th, very severe, bits of jagged ice as large as filberts fell for five minutes, covering the ground. Idaho, Ft. Lapwai, 23rd. Washington Territory, Bainbridge Island and Neah Bay, 24th.

RELATIVE HUMIDITY.

The percentage of mean relative humidity for the month ranges as follows: New England, 54 to 80; Middle Atlantic States, 54 to 78; South Atlantic States, 55 to 85; Eastern Gulf States, 59 to 77; Western Gulf States, 54 to 75; Ohio Valley and Tennessee, 60 to 68; Lower Lake region, 62 to 74; Upper Lake region, 58 to 73; Upper Mississippi valley, 61 to 72; Missouri valley, 62 to 73; Red River of the North valley, 72 to 76; Texas, 50 to 75; Middle Plateau, 33 to 42; Southern Plateau, 30 to 76; California, 43 to 77; Oregon, 56 to 69; Washington Territory, Olympia, 78. *High stations* report the following percentages not corrected for altitude: Pike's Peak, 70.8; Santa Fe, 32.7; Cheyenne, 51.2; Denver, 45.2; Mt. Washington, 79.6.

WINDS.

The prevailing winds during the month of April, 1881, at Signal Service stations are shown on chart No. II by arrows, which fly with the wind. Throughout the country east of the Mississippi the winds were from *west* to *northwest* except *southwest* along the South Atlantic coast. In the Western Gulf States and Texas, *southeast* to *southwest* and *south*. Along the eastern slope of the Rocky Mountains, *northeast* to *northwest* and *north*. Over the Middle and Northern Plateau regions, *west* and *southwest*. Southern Plateau, *variable*. Along the Pacific coast, *west* and *northwest*, except *southerly* in the Northern Pacific coast region.

Total Movements of the Air.—The following are the largest total movements at Signal Service stations: Mt. Washington, 25,080; Pike's Peak, 13,503; Portsmouth, 12,886; Hatteras, 12,670; Cape May, 11,717; Chincoteague, 11,515; Kittyhawk, 11,447; Delaware Breakwater, 11,006; New Shoreham, 10,863; Wood's Holl, 10,743; Indianola, 10,382; Cape Henry, 10,373; Dodge City, 9,667; Macon, 9,335; Fort Griffin, 9,320; Sandusky, 9,150; Sandy Hook, 9,123; Barnegat, 9,108; Ft. Elliott, 9,010; Champaign, 8,991; Decatur, 8,610; Philadelphia, 8,514; Ft. Sill, 8,421; Galveston, 8,214; Cedar Keys, 8,032. The *smallest* are Florence, 1,842; Phoenix, 2,064; Roseburg and Lewiston, 2,271; La Mesilla, 2,405; Visalia, 2,424; Tucson, 2,683; Deadwood, 2,746; Silver City, 2,975.

High Winds.—Winds of 50 miles per hour and over, were reported as follows: On the summit of Mt. Washington, 2nd to 7th, 11th, 12th, 14th to 19th, 21st to 23rd, 24th, 25th, 26th, 28th, 29th, 30th, on four of these dates the wind reached a velocity of 100 miles or over; the maximum velocity, 120 miles NW., occurred on 2nd, 3rd, 29th. On the summit of Pike's Peak, 2nd, 13th, 14th, 15th; maximum velocity 68, NW. 14th; Eastport, 52, NE. 15th; Thatcher's Island, 55, NE. 15th; New Shoreham, 60, NE. 15th; Cape Henry, 52, N. 14th; Kittyhawk, 76, NE. 14th; Hatteras, 60, N. 14th; Portsmouth, N. C., 88, NE. 14th; Ft. Macon, N. C., 52, N. 14th; Indianola, 51, NE. 4th; North Platte, 54, S. 30th; Fort Stevenson, Dak., 50, W. 26th; St. Vincent, Minn., 56, SW. 26th.

Local Storms.—De Soto Co., Miss., 12th, about 2 p. m., violent tornado appeared to originate near Commerce, a small town on the Mississippi, where it wrecked ten cabins, three gin houses,

and demolished a store and its contents, valued at \$2,000. From this place the storm passed in an ENE. direction, and was next heard of at a point about five miles northwest of Hernando. In this vicinity the loss to property and life was very severe, 25 buildings of various kinds were totally demolished and 10 persons killed. Length of storm path about 25 miles, width from 100 to 300 yards. Very heavy rain and hail followed this tornado at Senatobia and several other points in the vicinity, in some cases hail-stones falling the size of hen's eggs. It is of importance to note that the occurrence of electricity or thunder was not reported as observed from any part of the tornado's path. Through portions of Prairie, Monroe, Lee and St. Francis Co's., Ark., 12th, about 2 p. m., violent tornado passed from southwest to northeast, visiting several towns, among which were Brinkley, Forrest City and Cotton Plant. After the passage of the storm at these points showers of jagged pieces of ice, four to six inches in width and two to two-and-a-half inches in thickness, fell, resembling broken river ice. These tornadoes developed in connection with the passage of low area No. III northeastward from Texas to the Ohio valley. On the afternoon of the 12th warm southerly winds prevailed along the West Gulf coast and in the interior of the bordering States, which were opposed to the northward of Arkansas and Mississippi by cold northerly winds, presenting a contrast in temperature of from 35° to 50°. Still further northward in the States of Illinois, Iowa and Colorado snow was reported, with temperatures of 19°, 26° and 27°, and to the southward in lower Texas temperatures of 80° to 90° occurred. Safford, Chase Co., Kansas, 30th, about 6 p. m., tornado passed from southwest to northeast over section of country three miles north of station; path very narrow and destruction of property considerable. This storm developed in connection with an area of low barometer then extending from northern Kansas to central Minnesota and Dakota. On the afternoon of the 30th warm southerly winds, with temperatures ranging from 60° to 87°, prevailed over the Lower Missouri valley, opposed to the northward in Dakota and Minnesota by northerly winds producing contrasts of temperature ranging from 20° to 30°. At Emporia, Kan., very high southerly winds were reported during the day. Total movement from 8.35 to 10.35 p. m., 111 miles; from 10.03 to 10.08 p. m., velocity reached the rate of 72 miles per hour; at 10 p. m., velocity 64 miles per hour. Clay Centre, Kans., 24th, very violent, blowing down houses and trees and overturning railroad cars. Mammoth Cave, Ky., 12th, very severe, maximum wind velocity sixty miles. Garysburg, N. C., 29th, blowing down trees and buildings. Elsworth, N. C., 8th, buildings unroofed and other property damaged. Clarksville, Tenn., 28th, 7 a. m., very violent wind storm; several buildings unroofed. Fort Douglas, Utah, 18th, very violent, blowing down fences and unroofing buildings.

Water-spouts.—Cairo, 28th, three water-spouts observed one-half mile southwest of station and in close proximity. Toronto, Can., 26th, 10. a. m., on lake.

VERIFICATIONS.

Indications.—The detailed comparison of the tri-daily indications for April, with the telegraphic reports for the succeeding twenty-four hours, shows the general percentage of verifications to be 85.2 per cent. The percentages for the four elements are: Weather, 91.1; Direction of the Wind, 79.8; Temperature, 85.9; Barometer, 83.6 per cent. By geographical districts they are: for New England, 78.9; Middle States, 82.4; South Atlantic States, 86.0; Eastern Gulf States, 82.5; Western Gulf States, 87.8; Lower Lake region, 82.5; Upper Lake region, 82.2; Tennessee and the Ohio valley, 87.8; Upper Mississippi valley, 82.1; Lower Missouri valley, 82.8; Northern Pacific coast region, 89.4; Central Pacific coast region, 96.0; Southern Pacific coast region, 92.1. There were 88 omissions to predict (33 being due to the absence of reports from the Pacific coast) out of 3,690 or 2.44 per cent. Of the 3,602 predictions that have been made, 113, or 3.13 per cent, are considered to have entirely failed; 116, or 3.22 per cent, were one fourth verified; 457, or 12.69 per cent, were one-half verified; 453, or 12.58 per cent, were three-fourths verified; 2,463, or 68.38 per cent, were fully verified, so far as can be ascertained from the tri-daily reports.

Cautionary Signals.—119 Cautionary Signals were displayed during the month, of which 90, or 75.6 per cent, were fully justified by winds of 25 miles per hour or over at, or within a radius of 100 miles of the station. 29 Off-shore Signals were displayed, of which 24, or 82.75 per cent, were fully justified; 27, or 93.1 per cent, justified as to direction; 25, or 86.26 per cent, justified as to velocity, and 1, or 3.4 per cent, completely failed. 19 of the Off-Shore Signals were changed from Cautionary. 148 Signals of all kinds were displayed, of which 114, or 77.02 per cent, were fully justified. The above does not include signals ordered at display stations where the velocity is only estimated. 149 winds, of 25 miles or over, were reported, for which no signals were ordered. 2 signals were ordered late.

NAVIGATION.

Stage of Water in Rivers.—In the table on the right-hand side of chart No. III are given the highest and lowest stages of water, as observed on the Signal Service river-gauges during the month of April, 1881. The Ohio, Tennessee, Cumberland, Monongahela and Savannah rivers reached their highest stages between the 14th and 18th, none of which reported any dangerous rises during the month. The Red and Arkansas rivers reached their highest stages, the former